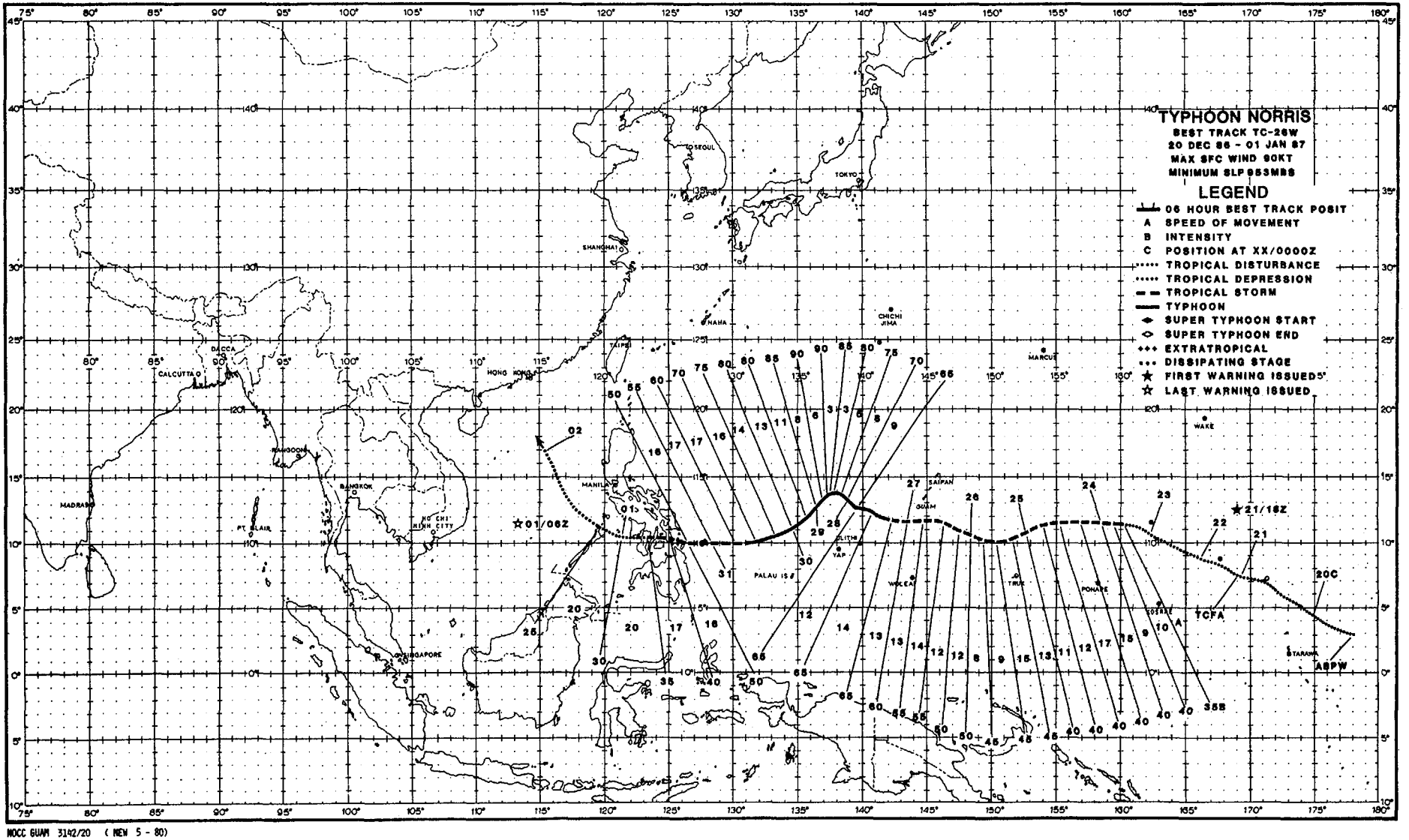

NOCC GUAM 3142/20 (NEW 5 - 80)

The final typhoon of 1986, Typhoon Norris, began as Typhoon Marge (25W) was moving through the Caroline Islands and south of Guam. Norris was first detected as a weak low-level circulation in the near-equatorial trough south of the Marshall Islands on 17 December. Initially, an anticyclone aloft at low latitudes near the dateline aided the development of Norris by providing a favorable low-shear environment.

First carried on the Significant Tropical Weather Advisory (ABPW PGTW) on 19 December at 0600Z, the disturbance drifted northwestward while its organization and convection remained minimal. On 20 December, the organization began to improve and at 210300Z, a Tropical Cyclone Formation Alert was issued.

The first warning was issued on 21 December at 1200Z on Tropical Depression 26W when Dvorak analysis of satellite reconnaissance indicated 30 kt (15 m/sec) winds were present (see Figure 3-26-1).

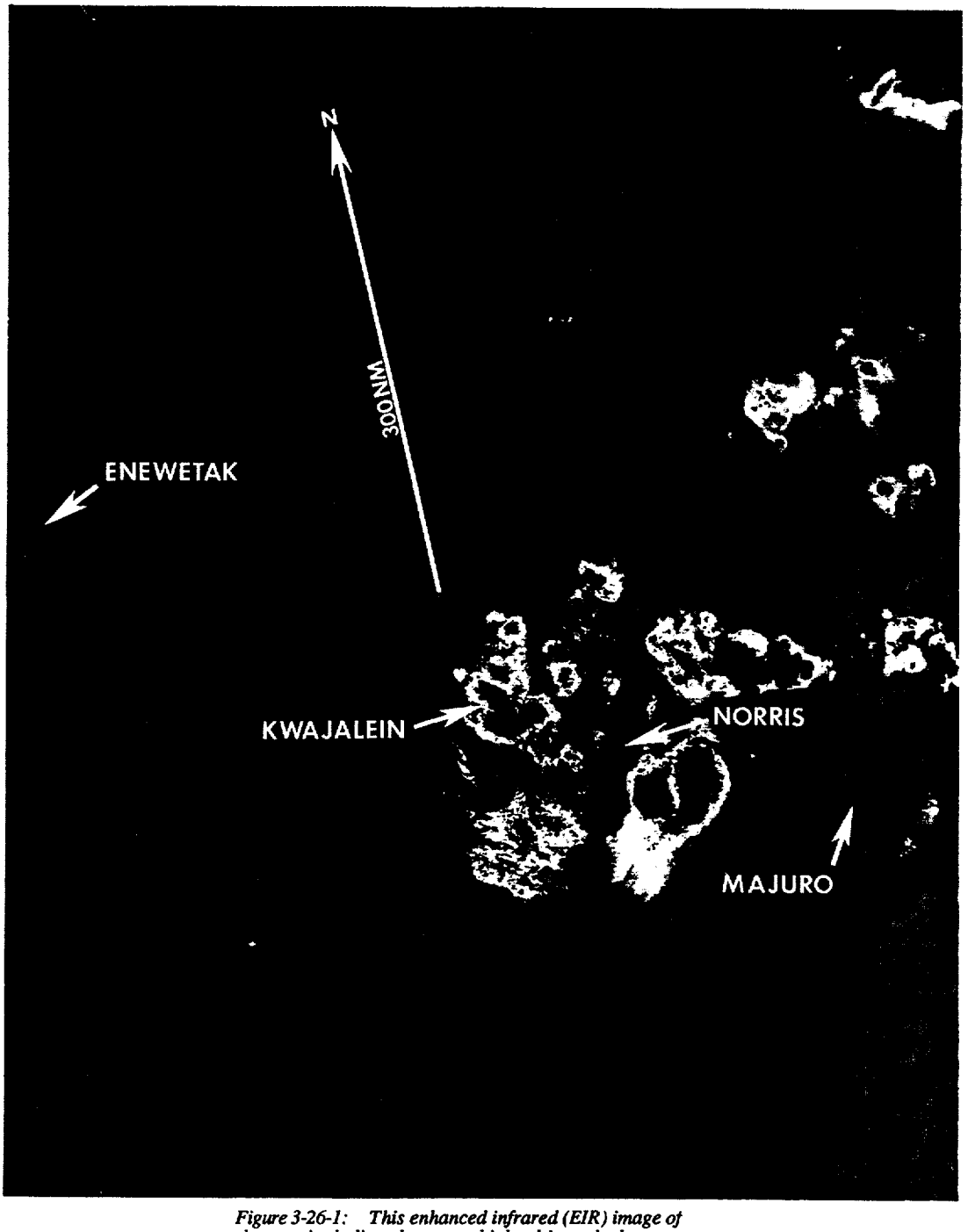

Figure 3-26-1: This enhanced infrared (EIR) image of the tropical disturbance, which ultimately became Typhoon Norris, shows it embedded in the near-equatorial trough (210756Z December DMSP infrared imagery).

Satellite imagery on 22 December revealed an exposed low-level circulation center with the convection displaced approximately 60 nm (111 km) to the west (Figure 3-26-2). Aircraft reconnaissance on the morning of 23 December located the low-level vortex. The Aerial Reconnaissance Weather Officer (ARWO) reported winds of 35 kt (18 m/sec) and a minimum sea-level pressure (MSLP) of 999 mb, which resulted in the upgrade to Tropical Storm Norris (26W) on the 230000Z warning.

From the time Norris began forming in the near-equatorial trough, the system moved steadily toward the northwest following the forecast under-the-ridge scenario. The movement toward the northwest was also influenced by the passage of a mid-latitude trough. On 23 December, the mid-latitude trough had moved to the east of the system and the subtropical ridge began to rebuild. Norris responded and moved westward. In addition, the low-level circulation center had just started to move under the convection (see Figure 3-26-3).

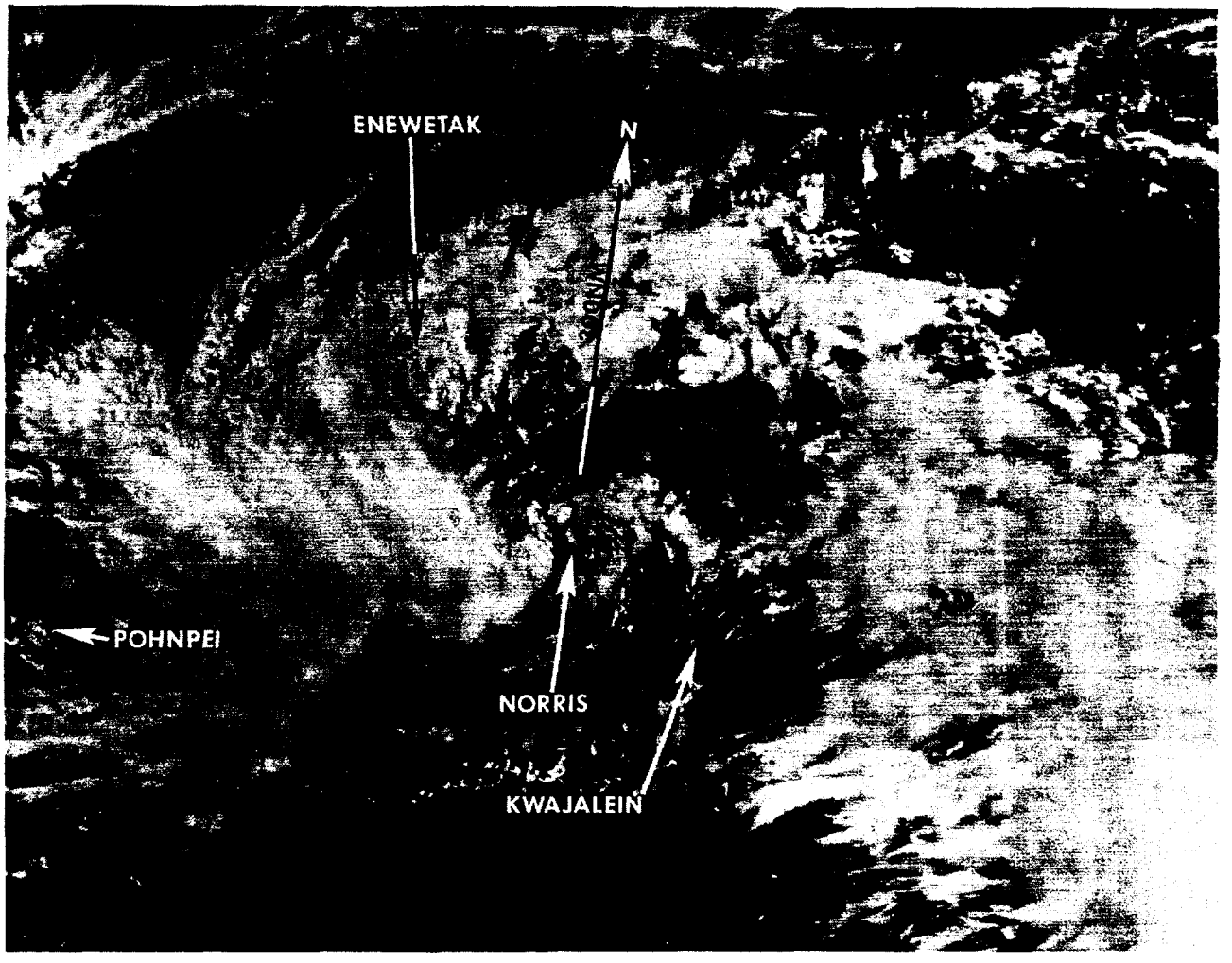

Figure 3-26-2: Vertical shear continues to force the convection towards the west of the low-level circulation center (220400Z December NOAA visual imagery).

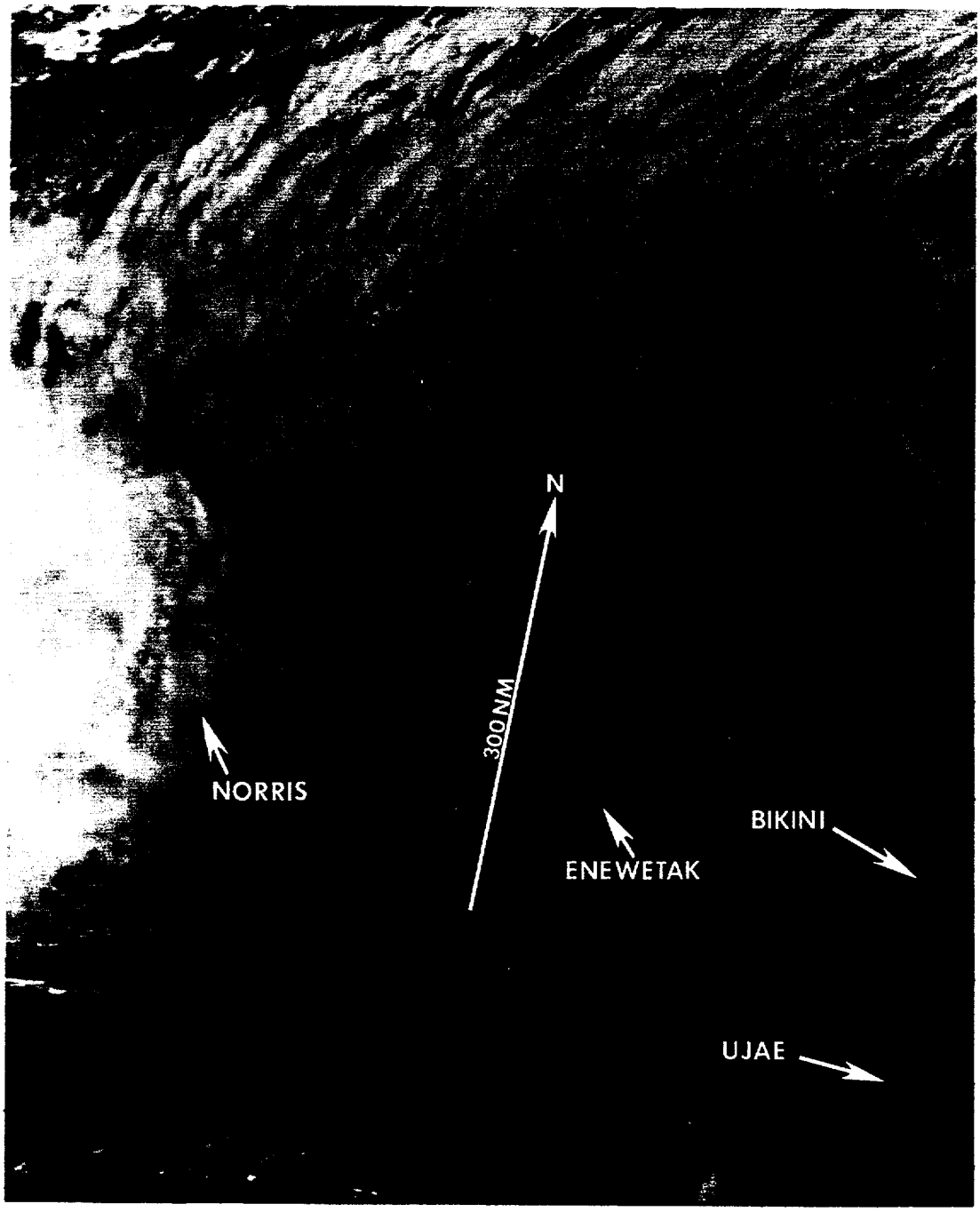

Figure 3-26-3. Tropical Storm Norris still struggling to get organized. The low-level circulation center is beginning to move under the convection (240338Z December NOAA visual imagery).

As the ridge continued to build, Norris began moving away from the forecast track and towards the west-southwest on Christmas Day (Figure 3-26-4). The forecast guidance from the dynamic One-Way Interactive Tropical Cyclone Model (OTCM) and persistence was for westward movement. Within 12-hours the southwestward drift stopped and Norris once again began moving toward the west-northwest. Aircraft reconnaissance on 25 December found the first indications of a developing elliptical-shaped eye.

As Norris moved towards the west-northwest, the system continued to intensify. Winds of typhoon intensity were forecast. Due to a mid-latitude frontal system moving off the Asian mainland, expected adjustment of the subtropical ridge, and an anticipated track change, officials in the southern Marianas braced for the worst. However, aircraft reconnaissance at approximately 261200Z found the movement more westward than west-northwestward. Over the next 12-hours residents of the southern Marianas Islands continued to wait and hope that Norris would miss them. Norris slipped by to the south, passing within 100 nm (185 km) of Guam. Guam experienced 50 kt (26 m/sec) winds and localized flooding, but damage was minimal.

After by-passing Guam and once again moving west-northwestward, Norris continued to develop (see Figure 3-26-5). Based on Dvorak intensity analysis of 65 kt (34 m/sec), Tropical Storm Norris was

Figure 3-26-4: Norris matures and moves toward the west-southwest on Christmas Day (250509Z December NOAA visual imagery).

Figure 3-26-5: Tropical Storm Norris, just prior to its being upgraded to a typhoon (270041Z December DMSP visual imagery).

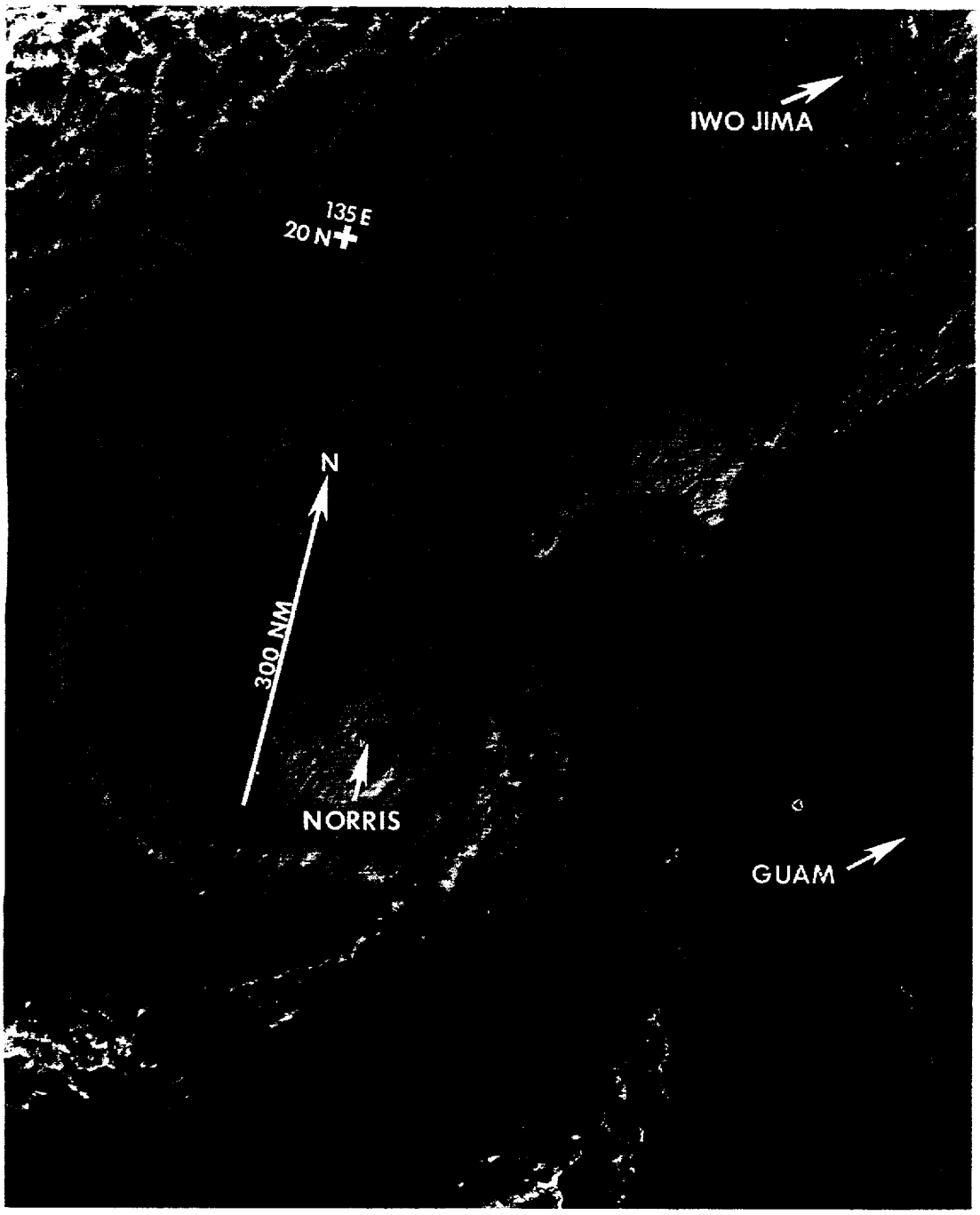

Figure 3-26-6. Typhoon Norris at maximum intensity. The forecast track, until this time, indicated that Norris would recurve and become extratropical (290000Z December DMSP visual imagery).

upgraded to Typhoon Norris at 270600Z. Aircraft reconnaissance at 271101Z reported an eye and a MSLP of 984 mb.

Norris continued moving northwestward toward the weakness in the ridge induced by the passage of a mid-latitude trough moving off the Asian mainland. Previous forecasts had indicated continued movement toward the west-northwest; however, as the mid-latitude trough moved further south and east, Norris' forecast track, starting with the 280600Z warning, was altered to indicate recurvature and extratropical transition.

By 290000Z, the trough moved east and Norris reached maximum intensity (see Figure 3-26-6). The ARWO on the reconnaissance fix mission earlier, at 282103Z, observed 89 kt (46 m/sec) maximum surface winds and a MSLP of 953 mb. Norris, which was caught along the edge of the modifying polar air and northwesterly flow in the Philippine Sea, abruptly changed course and moved southward for 36-hours. Once again the southwesterly course was not forecast or addressed beforehand by the OTCM guidance.

At 301200Z, Norris' track changed to due west as it headed towards the central Philippine Islands (see Figure 3-26-7). After being downgraded to tropical storm intensity at 301800Z, Norris moved into the South China Sea and continued to weaken. By 010300Z January, Norris was further downgraded to a tropical depression. By that time, strong upper-level southeasterly flow had exposed the low-level circulation center. Norris dissipated over water in the South China Sea on January 2nd.

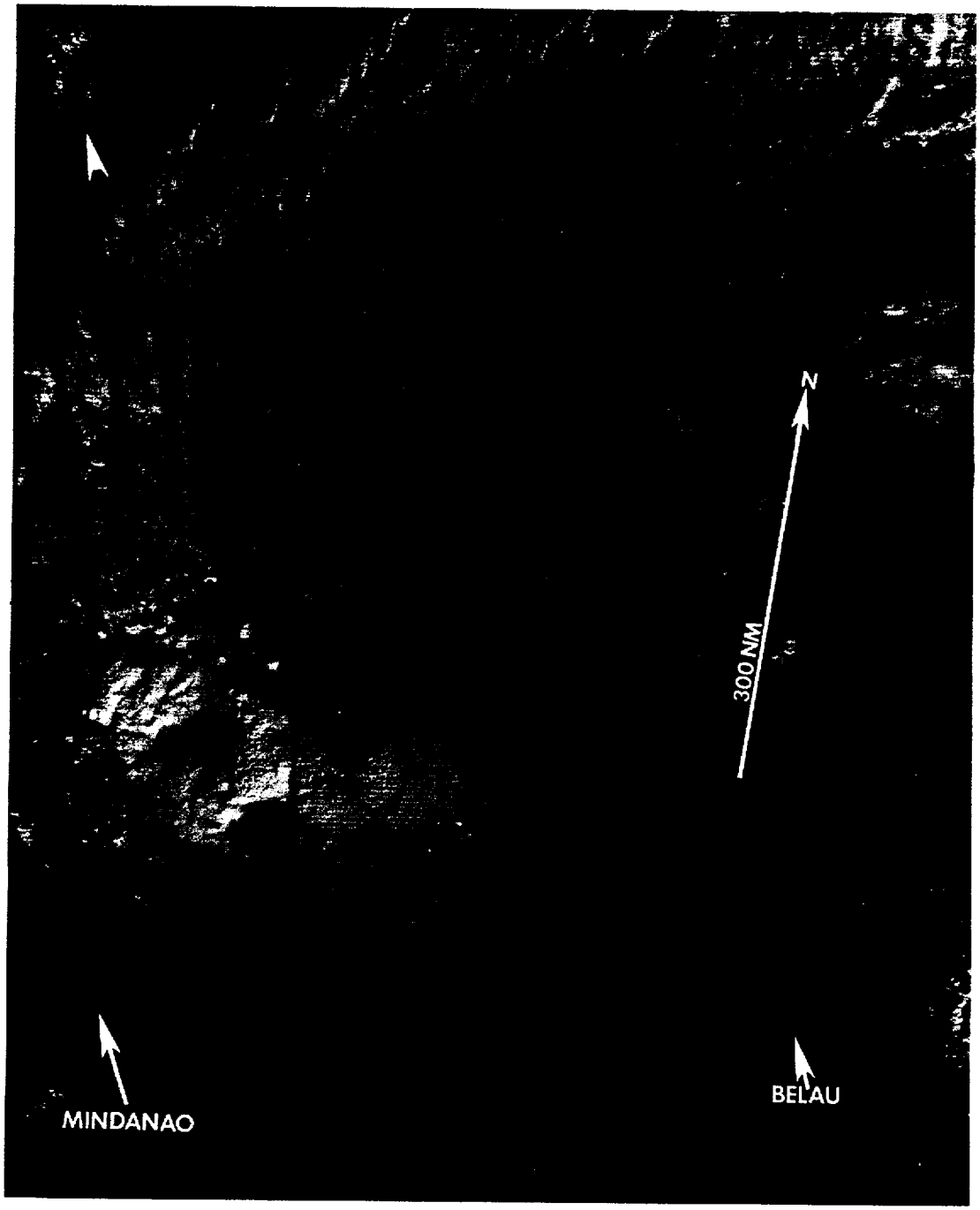

Figure 3-26-7: Tropical Storm Norris approaching the Philippine Islands (310101Z December DMSP visual imagery).